AFRL Collaborative Environment for Simulation Based Acquisition

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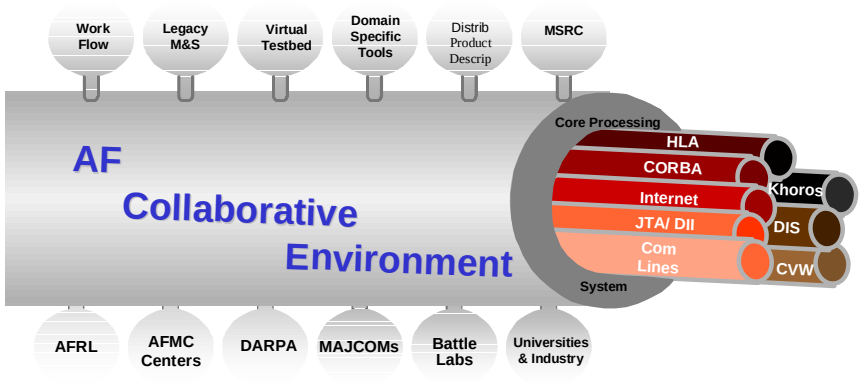
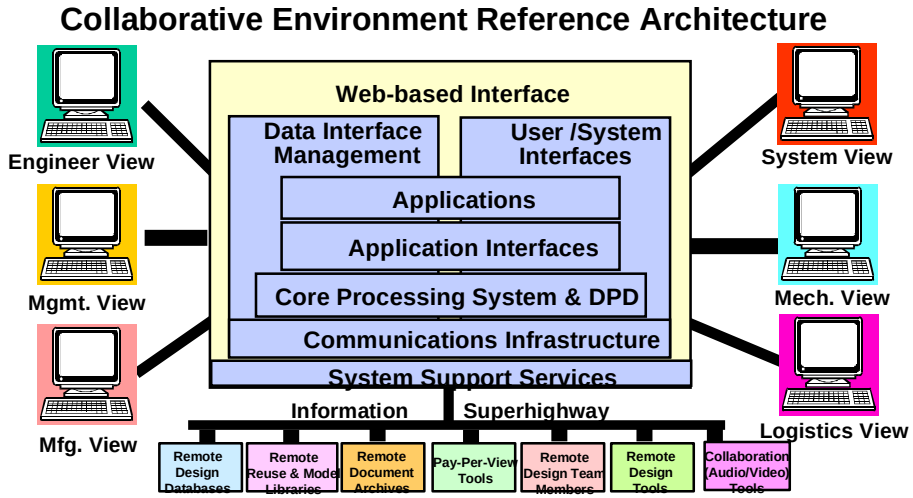
Collaborative Simulation Technology Branch
Information Systems Division
Information Directorate
AF Research Laboratory

Collaborative Enterprise Technology





Objectives:

To apply advanced simulation and information technology and engineering tools, including virtual testbeds, in an collaborative environment as a decision support system for

- **Simulation Based Acquisition**
- **Cross domain technology development**
- **System design and test and evaluation**
- **Distributed mission training**
- **Strategy & Planning**

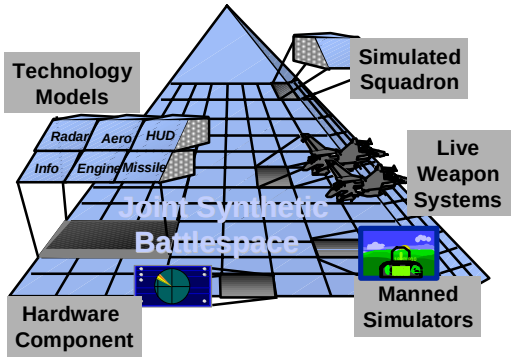
Payoff:

- **Framework for SBA collaborations**
- **Cross discipline, multiple domain sharing, integration & evaluation in a system of systems context**
- **Enables Virtual Engineering & Test**
- **Provides structure for cost of function/ performance affordability trades**
- **Enables collaboration with industry partners**

Simulation Based Acquisition

An Open, Distributed Collaborative System

- Integrated Product & Process Model
- Common Application Framework
- Underlying Communication Backbone
- Virtual Products In Synthetic Environments

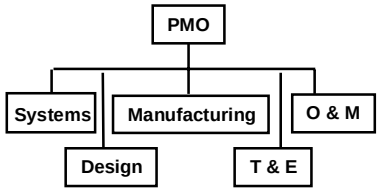


- A process supported by robust, collaborative use of simulation technology that is integrated across acquisition phases and programs
- "Try Before Buy" in a Virtual Environment
- Problem Solving Before System is Built & Across the Life Cycle
- Tying Together the S&T, Acquisition, and User Communities

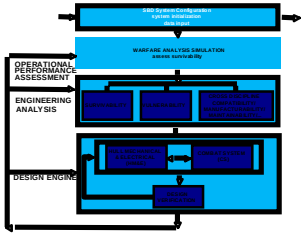
CEE Vision

Data → **Information** → **Knowledge** → **Wisdom**

Organization



Engineering Process

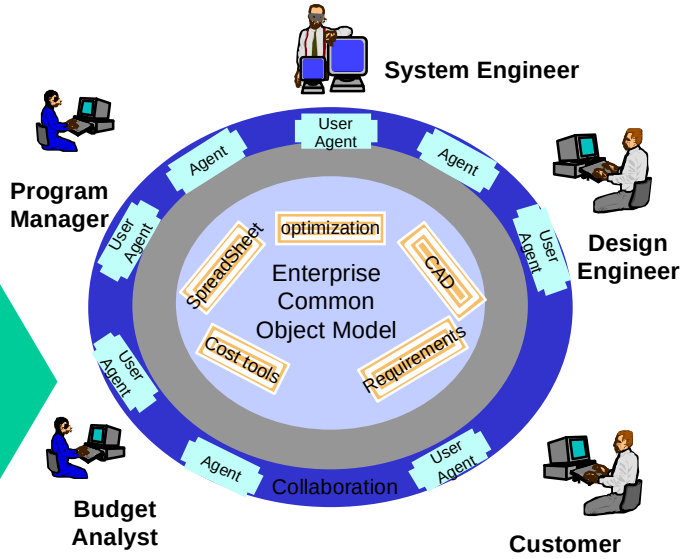


Tools

Data

Process for configuring a CEE

- **Product/Process Model**
- **Tool Integration**
- **Data Mediation**
- **Work Flow**
- **Intelligent Agents**
- **Collaborative Framework**

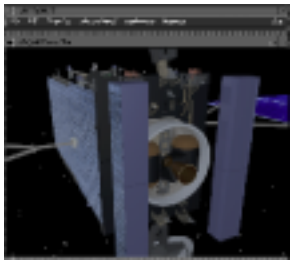


CEE

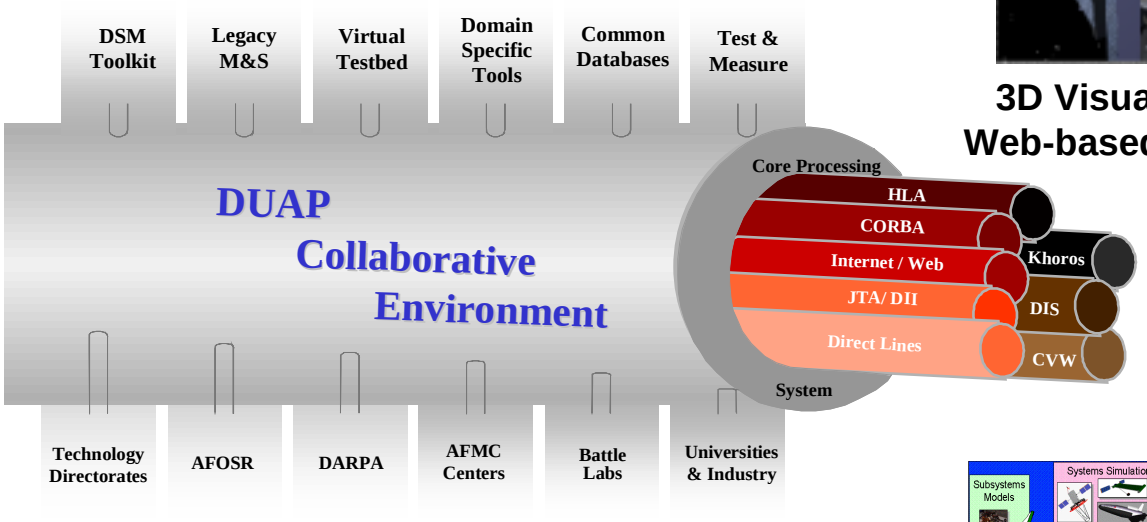
AFRL Collaborative Environment

Leveraging DARPA SBD & DUAP CEE

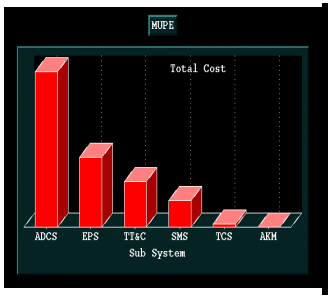
Enterprise Common Object Model/ Smart Enterprise Model



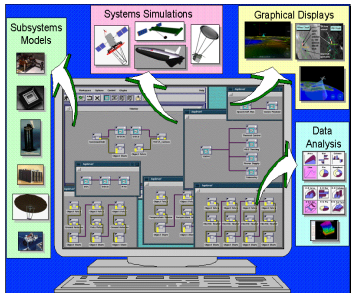
3D Visualization Web-based Viewers



Workflow, Process Modeling, & Human Collaboration Tools

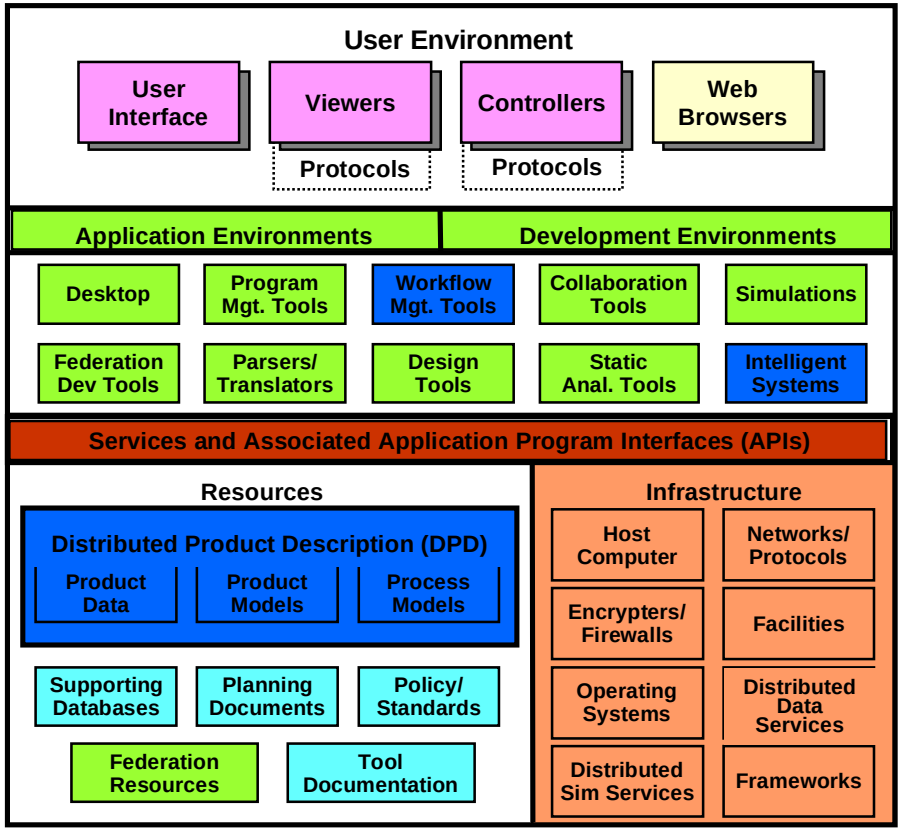


Affordability & Cost Tools

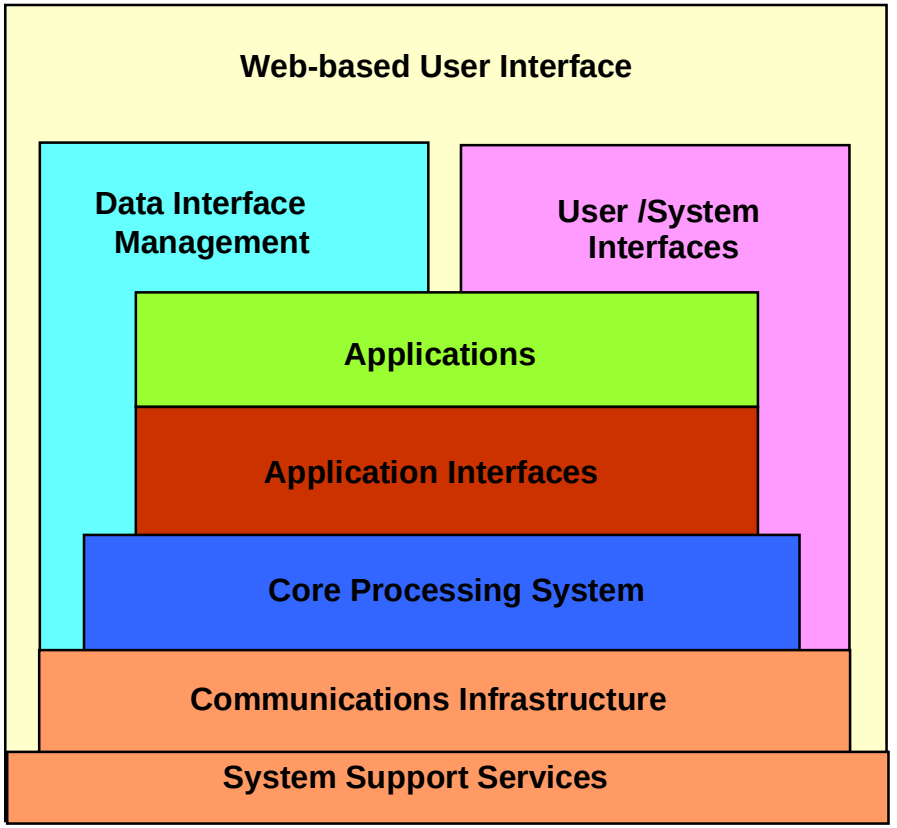


Engineering & System Modeling (JWARS, JSIMS, JMASS, Legacy, COTS, HLA)

SBA Roadmap Reference System Architecture



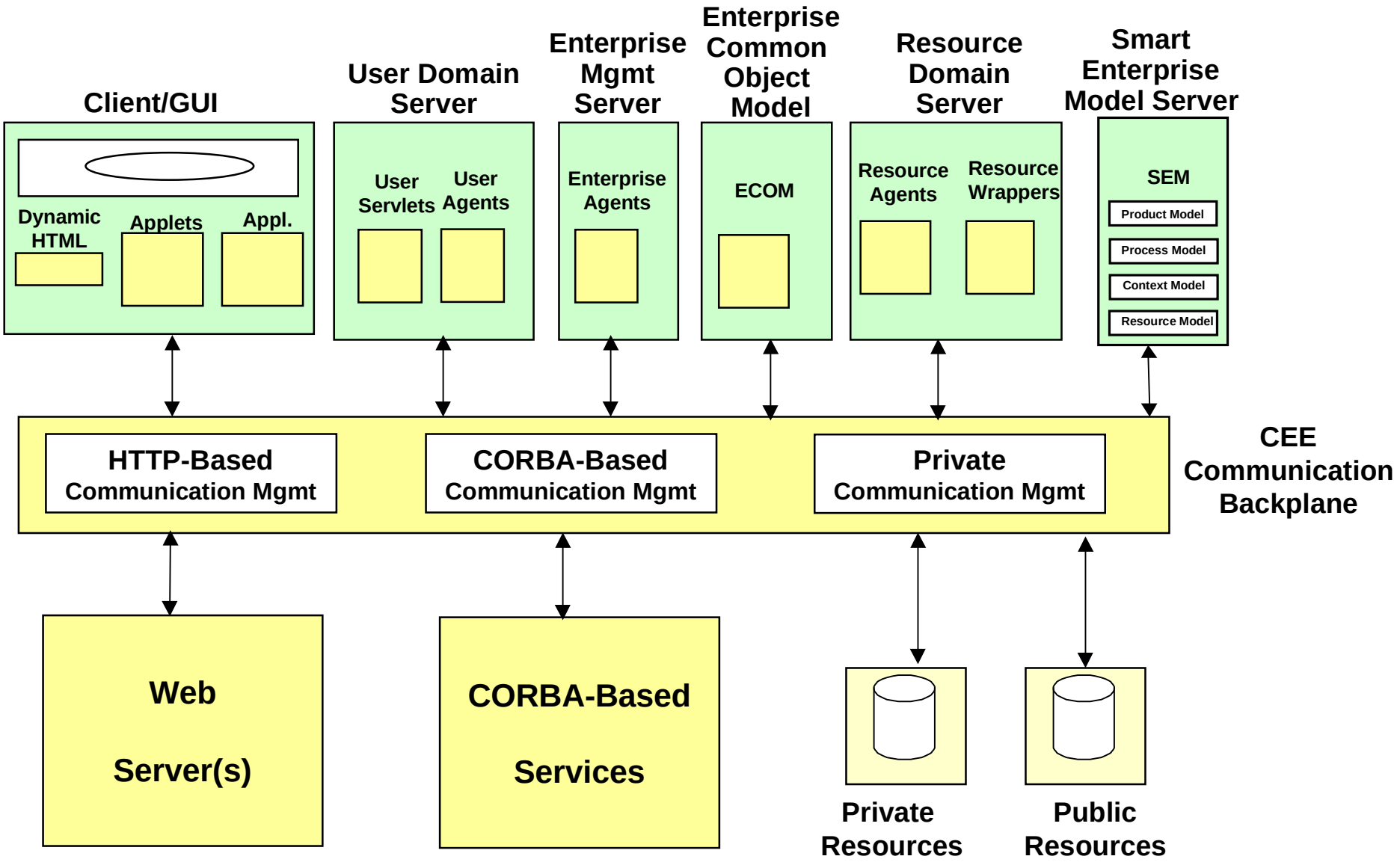
SBA Reference System Architecture



AFRL CE Reference Architecture

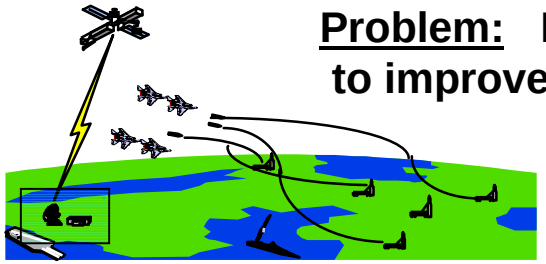
Color coded mapping to SBA Reference System Architecture

DUAP CEE Implementation - Oct 98



Sep 98 CE Experiment:

Sensor-DecisionMaker-Shooter-Weapon



System of Systems

<u>Problem:</u> Examined a limited set of technology alternatives to improve the ability to locate and destroy mobile targets.

Collaborative Environment

1. **Baseline Case: Fighter**
2. **Fighter, Off Board C4I Information**
3. **Fighter, Improved C4I via enhanced Ground Image S/W**

ECSRL
Collaboration Manager
WPAFB, OH

Lockheed
Requirements & HTML Server
Palo Alto, CA

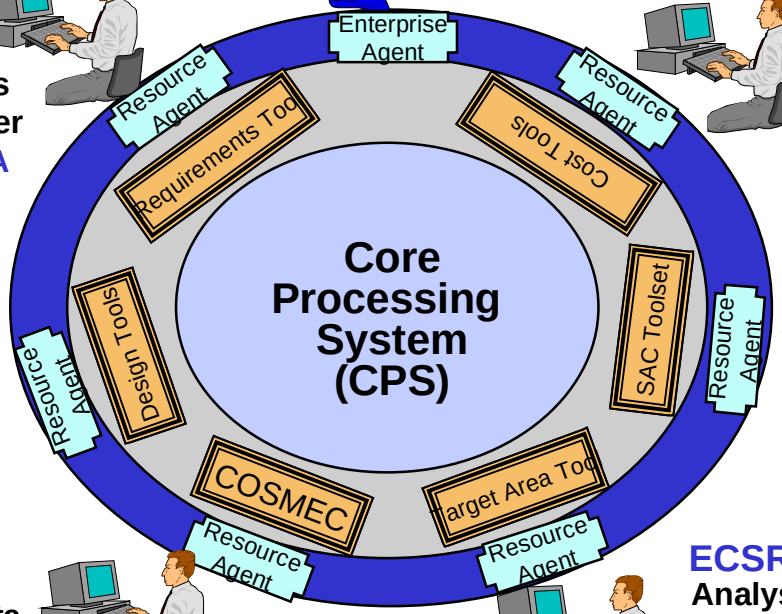
ECSRL
Cost Analysis Engineers
WPAFB, OH

Ball ATC
COTS Sensor Design Tool
Boulder, CO

IDAL
Survivability Analysts
WPAFB, OH

Ball ATC
Hyper Spectral Data Processing Engineers
Dayton, OH

ECSRL
Analysis Engineer
WPAFB, OH



Fall 99 Spiral Development Goals

- **Architecture Enhancements:**
  - Workflow
  - Variable Thickness GUI
  - CORBA Services
  - Product & Process Model Tools
  - Multiple ORB Support (DCOM, Java…)
  - Human Collaboration Tools
- **Experiment:**
  - Expand Command & Control capabilities with constructive simulation
  - Incorporate Space Based Radar Simulation
  - Incorporate Producibility & Virtual Manufacturing Assets
  - Demonstrate Enhanced Synchronous Collaboration Support
    - -- Real-time Mission Model
    - -- Man/Hardware-in-the-loop Simulators
  - Demonstrate compliance with High Level Architecture (HLA)
  - Access High Performance Computer (HPC) Resources For Military Worth Analysis

Collaborative Enterprise Environment

Current Technology Development Programs

AFRL CE Technology

CEE Integration

Joint Real-time Testbed

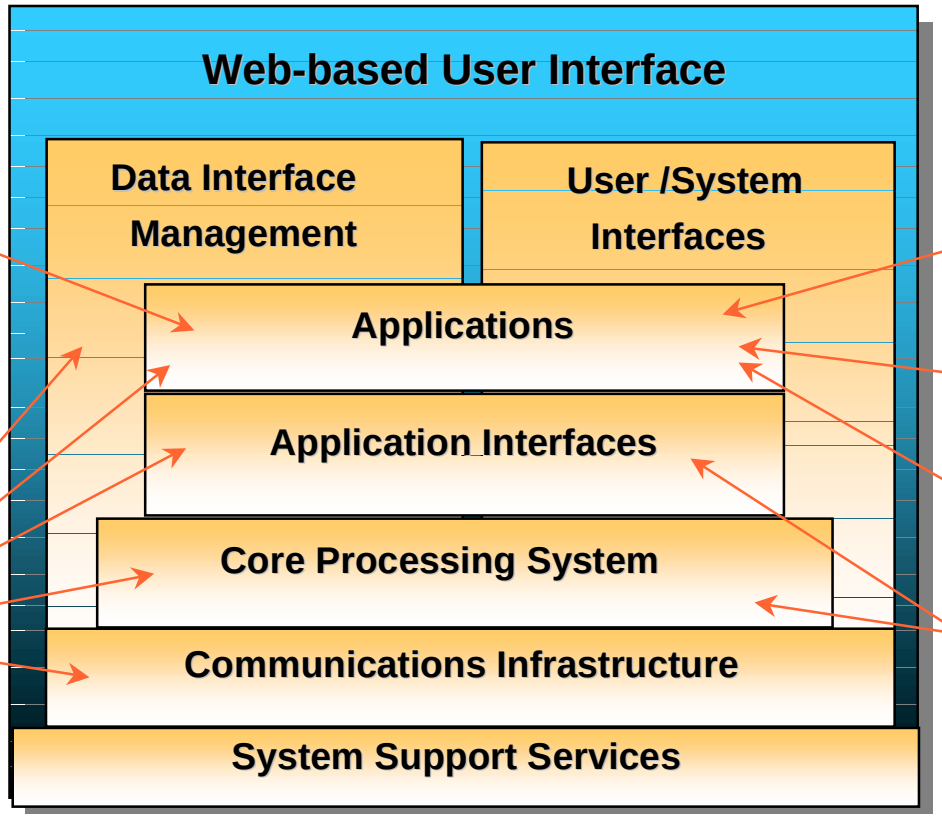
Fighter Testbed

Global Awareness

Virtual Testbed

DUAP CEE

Technical Framework



SBIR

Visual Programming

Costing Models

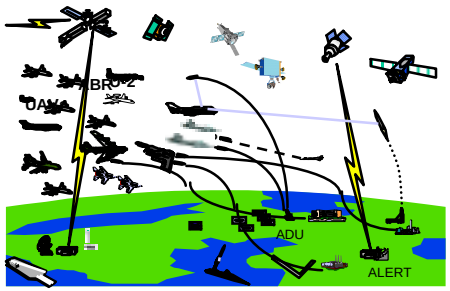
C2 Process Tools

Reengineering Tools

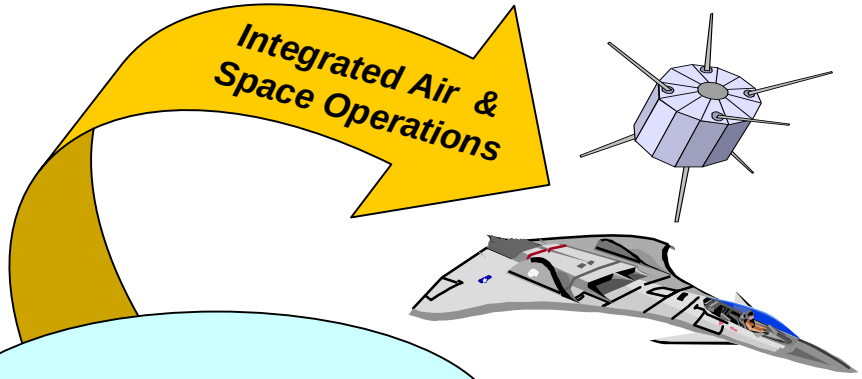
Advancing CEE Architecture And Applications

21st Century Aerospace

A Vision for Distributed Collaborative Environments



C2 ISR



Operational Community

ESC
Command & Control

SMC
Space Systems

AF Collaborative Environment

Tools

Systems

Simulations

AAC
Armament

ASC
Aeronautical

Industry

AFRL
Technology

NAIC
Intelligence